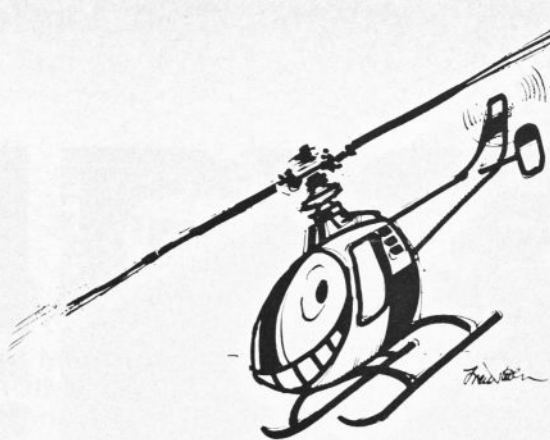


HOVERING ABOUT

by JIM MORLEY



THIS column has been accused of dwelling too much on the crashes. This, of course, is a very typical journalistic fault, but I like to think there is a difference. In the typical case it is done for sensationalism or excitement, to pander to the blood lust of the masses. In this column it is to warn potential helicopter fliers that it is not as easy as it looks, and that when tried, not to give up too easily.

Another accusation (which must mean the column is being read!) is that I am out of date on autorotation (the continued flight after power failure). There are now several models on the market very capable of being flown with the power off, and some pilots, I am told, make it their favourite trick. As a trick, when the power comes off to your command, OK, but I have a feeling that it won't reduce the number of mishaps in the future by very many, and that one of the best ways to reduce worrying about power failure crashes is to have two models. Note that I said *one* of the best ways, and that it was to reduce the worry, not the mishap. To overcome nervousness is a major part of the battle in the other (pilot error) sort of mishap.

Hagley Fly-in

The last couple of months have seen the majority of the special helicopter events of the year, one such being the Hagley Fly-in at the Old Disconians Rugby Club near the M5 south of Birmingham. The host club are lucky to have good facilities available and a free lunch to all fliers was a nice touch. A fair turnout (30 or so with a good mixture of helicopters) enjoyed the day taking the opportunity to look, exchange ideas and practice. The BRCHA was represented by Pat Dubock and Watford Models (Vago Nordigian) made the journey to help the proceedings.

Preston Helicopter Gala

The Preston Helicopter Gala at the Great Northern Show was a worthy effort held to one side of the showjumping and other horsey events. The organisers allowed competitors to have a mixture of fly-in and competitions, the latter being very mild and non-damaging, but made a little difficult by a gusty wind. For example the ring on a plastic bucket to be

hooked by the skid proved too difficult, though organiser Chris Garside managed an isolated score. Who was the idiot who tried to stop Chris Rigby of Preston Model Centre getting too frustrated by putting the bucket onto his hovering skid, only to be reminded that a load forward induces forward flight by being promptly chased off the flight line by the flailing chopper? Competition stalwart Gary Richardson won the landing event but couldn't manage the grappling-hook event any more than anybody else. It might sound easy but the hook never seems to swing the right way, and if you watch it (the hook) you're not flying the helicopter. Scope for practice here I feel. One of the highlights of the day was Dave Nieman turning up in a full size Bell 47g and although helicopters did not endear themselves to the horsey types, perhaps understandably, I don't think there was really any ill-feeling, and a very good day resulted, which, some thanks to this column, drew enthusiasts together from quite a distance.

Bretons Fly-in

Another event which owes some of its good attendance to this column was the Bretons MFC scale fly-in at Hornchurch, you will remember the build-up to it some months back. Certainly it seems that the attraction of a meeting where flying is not too demanding will draw the crowds and superb organisation by the club, including the non-helicopter types, (thank you) a splendid flying site and even good weather helped to make it, I am sure, the helicopter event of the year.

The programme comprised a concours and separate scale flying competition in the morning, with demos at lunchtime and fun events in the afternoon. Yours truly was asked to be a judge of the scale flying and after some discussion prior to the event the following schedule was devised: Fig. 1.

On the day it seemed to work well, with pilots only attempting what they knew they could do, and enabling a lot of new names to appear in the entry list. Of course the fact that the three judges were given really comfortable chairs has a lot to do with the favourable comments in this column on the organisation.

The first of the fun events was an *Action Man* pick-up, with a grappling hook and wire loop on

the victim's head. It wasn't practical to have him floating in water as planned, the swinging hook was enough of a problem without allowing for downdrafts blowing the target away. So he was sat on the ground and snatched up and put down, the latter proving about as difficult as the former. Best time for this was 1 min, 34 seconds.

The width judging contest had to be abandoned due to the wind blowing the foam tiles off the poles before the helicopters got there, a pity it would have been a spectacular event.

The third event was slalom. Knocking down three plastic bottles placed about 20ft. apart then returning to the start box. An interesting event this, and not as harmful to helicopters as you might think, though to be fair, perhaps two runs should be allowed. Some models actually slid the bottles without tipping them, which seemed incredible, I'll bet that couldn't be done intentionally!

The organisers invited me to donate a special award for the best *Morley*. I was so pleased to see a really splendid example of the 1/7 Bell 47g that in my eyes the first class examples of the 2c were just beaten. It was very gratifying to see so many present too.

Worthy of your attention in the results (Fig. 2) is the fact that the scale flying was won by the experts, but not by a big enough margin to discourage the new names. It really was good to see such a variety amongst the 50 or so entrants. A nice idea was the profusion of awards made by the organisers in an attempt to keep as many people as possible happy. If an entrant won a second award the idea was to move the list down and include another name. I think the Mayor, who had come along to honour the occasion rather enjoyed the bartering that this led to.

If any criticism is due it is directed towards the competitors who didn't point out to the judges the 'special' features of their model to enable a fair assessment of the 'effort bonus'.

A super day and a pity that the BBC didn't choose to show more of the 500ft or so of film taken. Apparently it qualified for a few seconds of John Craven's Newsround at 5.00pm on Monday; how many interested parties were watching at that time?

On clutches

A lot of people have trouble with clutches, I

BRETONS M.F.C.

Fig. 1

Scale flying competition schedule

Pilots must display number clearly on clothing
Pilots will be called to ready box. They must ensure that they have the frequency peg before entering the box. Model is to be started and may be test hovered for a few seconds in the Ready Box Area. When the previous flyer leaves the flight line the model may be carried or flown to the start box. Pilots must inform judges of their entry number and call clearly when ready to commence schedule (a caller is optional). The flight schedule is as follows with marks as shown:

1. Take off and hover for 10 seconds at head height
2. Fly forward to box No. 2 and land
3. Take off and fly sideways to left or right and land in next box
4. Take off and fly freestyle for approximately 2 minutes
5. Land realistically near to start box

A	General appearance colour scheme & noise	Poor & Noisy=0	Realistic	=10
B	Effort bonus	Standard kit=0	Freelance	=10
C	Take off and hover	Jump =0	Smooth	=10
D	Forward flight and landing	Bouncy =0	Gentle	=10
E	Sideways take-off and flight	Tail waggly =0	Positive	=10
F	Approach and landing at box	Dump =0	Gentle	=10
G	Accuracy of landing U/C only	Miss =0	Centre	=10
H	Freestyle scale like flying 2 minutes approx.	Hairy =0	Very scale	=10
I	Execution of manoeuvres during 2 minutes	With respect to full scale		0-10
J	Final landing	Dump =0	Very scale like	=10
Note: Sideways flight and landing is pilots choice left or right				Possible Total 100

Fig. 2

Results

Scale	1st. Len Mount	209	Schluter Huey Cobra
	Dave Nieman		Hirobo Jet Ranger
	2nd. Keith Whiddett	205	Mongrel Jet Ranger
	3rd. Mike Weston	200	Graupner Bell 212
	4th. John Day	190	Morley 2c Bell 47g
Concours	1st. Tish Swiecicki		Morley 1/7 Bell 47g
	2nd. Dave Nieman		Hirobo Jet Ranger
	3rd. Warren Bailey		Morley 2c Bell 47g
	4th. Terry Bridel		Hirobo Lama
Rescue	1st. Mike Weston		Graupner Bell 212
	2nd. Len Mount		Schluter Huey Cobra
	3rd. Mike Young		Schluter Heliboy
	4th. Warren Bailey		Morley 2c Bell 47g
Slalom	1st. Dave Nieman		Hirobo Lama
	2nd. Warren Bailey		Morley 2c Bell 47g
	3rd. Len Mount		Schluter Huey Cobra
	4th. John Day		Morley 2c Bell 47g



suppose the set up can be very critical in a number of ways on different designs, but it isn't always the clutch. I have seen people open the throttle wide to check power while holding the rotor, and many require too much and expect the rotor to stop on tickover after landing. The clutch is only there for one reason, and that is to allow you to start the motor, other advantages are a bonus.

There are diversions, but let us discuss three types of the centrifugal ones fitted to model helicopters. (1) the old fashioned or well tried car type with shoes cut from a ring with wire springs. (2) the one piece shoe with saw cuts into a disc. (3) the cast shoes on slides with tension springs.

The clutch lining, if any, can be fixed to the shoes or to the housing without affecting the drive, except that it is safer (from heat build-up and glue area etc) to have it fixed to the housing and there is also more of it. You can have a high friction lining of leather or cork (μ , the coefficient of friction = 0.3 approx.) with the disadvantage of easy burn-out or chafing so that friction is much less and oily performance is very poor ($\mu = 0.05$). Or a low friction to start with, metal to metal ($\mu = 0.2$) where oily performance is better, or rather less-reduced, may clear itself anyway but is possibly noisy for radio. Clutch fabric ($\mu =$ approx. 0.25) will stand a lot of heat, wear well, have a good oily performance and also possibly clear itself. After all, it is made for the job, not covering cows or standing hot drinks on, but even so won't stand infinite abuse.

When it comes to the springs, to reduce the pressure at low rpm when we want slip, then the easiest is the saw cut disc but the machining limits are so very critical and non-adjustable. At least with a bent piece of wire you can vary the tension or change the gauge. Even leave it out if you have a really obedient engine and the trailing shoe format.

Since we're talking about aircraft then the efficiency may be taken as torque transferred relative to weight of clutch, in which case a leading shoe design (where due to the shoe pivot being behind the contact point there is a servo or mechanical action adding pressure to the one obtained by centrifugal force) is very superior, but in practice may be let down badly by the characteristic of snatch in load take up. So we usually use trailing shoes.

If you are careful and clever with your pivot point on trailing shoe, you can make contact point of shoe to lining come at a position where the mechanical "disadvantage" is not very much, and also where most of the shoe weight is at a mechanical advantage for applying the pressure when spinning. The size, or area, or pressure doesn't really affect the performance of the clutch, rate of wear perhaps, but not torque transmitted.

A lot of readers have failures with the disc and saw cut type of shoe, the reason of course is mostly the machining tolerance but if any "chatter" is present then the "hinge" (?) point is bound to fatigue pretty smartly. The drum and

disc have to be very close or the bend at the "hinge" is excessive, being close means the contact point is a long way back and shoe weight is at a big mechanical disadvantage. A lot of the weight of the disc is doing no good at all, except as a flywheel and poorly placed for that, so hence the poorer efficiency.

If the hole at the end of the saw cut is too close to the edge then drag loads will fatigue the hinge, if too far away then the stress at the thinnest point is very high when deflected the fixed amount to allow the shoe to contact. So what can be done? Well, assuming that it is machined to a correct design a considerable increase in life could be achieved by polishing the inside face of the hole, and putting a small radius on the edge of the hole. This last is where your fatigue crack will begin, and delaying the start of a fatigue crack is half the battle. If you try to elongate the hole so that your shoe is on a leaf spring instead of a hinge then it will be less stressed but also transmit drive a little earlier. It is rather critical.

A clutch can be smaller if isolated from the rotational surges of the engine shaft by say being at the second stage, that is, after a drive belt or cushion coupling. If at the second stage it will be rotating more slowly of course and needs to be bigger again to transmit the same torque. There again it may be smaller, because the "environment contingency factor" is smaller, in other words it is out of oil and heat.

A clutch doesn't need to be twice as big to transmit twice the power and the foreign problems of design explain why there are a lot of different types.

More on two engines

Definitely a worthwhile experiment, the *Seaking* with two 40s. As reported in the last HA, I think it would be a good idea to have a separate servo each for collective and engine if you really expect to fly on one engine.

Since the last article there have been several flame outs. I even pushed my luck and flew until one fuel tank ran out, but the pitch is too great for one engine really and a fraction should be taken off relative to throttle.

I haven't worked out how best to do this, it ought to be automatic except that I don't fancy the extra complications, it's so little that it's best to make do and land quickly.

Those who have seen the *Seaking* seem impressed; unfortunately when at the Northern Gala (its home ground if you like, since the body is from the Preston Model Centre) the demonstration was curtailed before it began by putting one wheel in a pot hole just before lift off and tripping it up at the expense of the blades. One possible snag with wheels instead of skids on 'copters.

However, at Breton's do it was ably and impressively flown by Mike Young who got quite carried away by the retract switch. Incidentally, it is this retract switch which made me say the separate engine and collective servo should be automatic. It is incredibly difficult to operate unless you wait for just the right moment. You



Two shots from the Bretons Fly-in. Above left: Gary Western with Graupner Bell 212. Above: John Griffiths brought along his four-bladed Schluter Bolkow.

can't let go of a stick to switch, and even having one finger on it in anticipation isn't as satisfactory as you might imagine. You get used to it though, well Mike did!

My two engine layout for this model is satisfactory, just, albeit a little 'Heath Robinson' at the moment and can be criticized easily, but is a great experiment. It wants to be built properly now, though I intend my next twin to be the prototype 1/7 Bell 47g that now sports a very tired old *Merco 61*. I plan to put two *Irvine 30* motors on board during the winter as soon as they are available.

Doughnut Vortex

A customer asked me what was wrong with his setting up of collective pitch or the design, he wrote: 'when holding the model in hover for a long period the pitch drops off and the engine speeds up with the model coming down. This does not show itself if you take off and fly around. Everything seems in order.'

An interesting one this, the sort of thing that makes choppers fascinating. What happens is simply — when you know about it! — that in calm conditions the air starts going up again all round the rotor after having been accelerated downwards by the rotor blades to support the model. As you stay in one position so the air rolls faster and faster until the model is trying to climb up a column of downward moving air, hence the drop. And hence my name of doughnut vortex, the sort with the hole in the middle not jam. Perhaps Polo vortex would be better.

There is nothing you can do about it, except enjoy it, and fly forward out of it.

Talking of doughnuts, reminds me of Christmas puddings. This is for the December issue and I would therefore like to wish you all what you want for Christmas and the New Year. Where did the summer go to? Have I really written this column for all that time! Oh, who was that idiot at Preston? ... yours truly of course!

Below: they called it slalom — skittles might have been a better choice!

